

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST FOR ACCESS TO AN ABANDONED APPLICATION UNDER 37 CFR 1.14

Bring completed form to:
File Information Unit
Crystal Plaza Three, Room 1D01
2021 South Clark Place
Arlington, VA
Telephone: (703) 308-2733

RECEIVED

MAY 16 2006

File Information Unit

In re Application of

Application Number

Filed

08/322,348

10/13/94

Paper No.

#18

I hereby request access under 37 CFR 1.14(a)(1)(iv) to the application file record of the above-identified ABANDONED application, which is identified in, or to which a benefit is claimed, in the following document (as shown in the attachment):

United States Patent Application Publication No. _____, page, _____ line _____.

United States Patent Number 5,604,097, column 1, line, _____ or

WIPO Pub. No. _____, page _____, line _____.

Related Information about Access to Pending Applications (37 CFR 1.14):

Direct access to pending applications is not available to the public but copies may be available and may be purchased from the Office of Public Records upon payment of the appropriate fee (37 CFR 1.19(b)), as follows:

For published applications that are still pending, a member of the public may obtain a copy of:

- the file contents;
- the pending application as originally filed; or
- any document in the file of the pending application.

For unpublished applications that are still pending:

- (1) If the benefit of the pending application is claimed under 35 U.S.C. 119(a), 120, 121, or 365 in another application that has: (a) issued as a U.S. patent, or (b) published as a statutory invention registration, a U.S. patent application publication, or an international patent application publication in accordance with PCT Article 21(2), a member of the public may obtain a copy of:
 - the file contents;
 - the pending application as originally filed; or
 - any document in the file of the pending application.
- (2) If the application is incorporated by reference or otherwise identified in a U.S. patent, a statutory invention registration, a U.S. patent application publication, or an international patent application publication in accordance with PCT Article 21(2), a member of the public may obtain a copy of:
 - the pending application as originally filed.

Rayline K. Petitt

Signature

Rayline K. Petitt

Typed or printed name

n/a

Registration Number, if applicable

703-415-3060

Telephone Number

May 16, 2006

Date

RECEIVED

FOR PTO USE ONLY

Approved by:

File Information Unit

Unit:

This collection of information is required by 37 CFR 1.14. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. BRING TO: File Information Unit, Crystal Plaza Three, Room 1D01, 2021 South Clark Place, Arlington, VA.

United States Patent [19]
Brenner

[11] **Patent Number:** **5,604,097**
[45] **Date of Patent:** **Feb. 18, 1997**

- [54] **METHODS FOR SORTING POLYNUCLEOTIDES USING OLIGONUCLEOTIDE TAGS**
[75] **Inventor:** Sydney Brenner, Cambridge, England
[73] **Assignee:** Spectragen, Inc., Hayward, Calif.
[21] **Appl. No.:** 358,810
[22] **Filed:** Dec. 19, 1994

Related U.S. Application Data

- [63] Continuation-in-part of Ser. No. 322,348, Oct. 13, 1994, abandoned.
[51] **Int. Cl.⁶** C12Q 1/68; C12N 15/10; C07H 21/00
[52] **U.S. Cl.** 435/6; 536/25.4; 435/172.3
[58] **Field of Search** 435/6, 172.3, 320.1; 536/25.4

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,302,509 4/1994 Cheeseman 435/6
5,482,836 1/1996 Cantor 435/6

FOREIGN PATENT DOCUMENTS

2036946 10/1991 Canada
0303459A3 2/1989 European Pat. Off.
90107066.4 10/1990 European Pat. Off.
WO93/17126 9/1993 WIPO
WO90/03382 4/1990 WIPO
WO92/00091 1/1992 WIPO
WO92/10587 6/1992 WIPO
WO92/10588 6/1992 WIPO
WO93/06121 4/1993 WIPO
WO93/21203 10/1993 WIPO
WO93/22680 11/1993 WIPO
WO93/22684 11/1993 WIPO
WO94/08051 4/1994 WIPO
WO95/20053 7/1995 WIPO

OTHER PUBLICATIONS

Kuijper et al., "Functional cloning vectors for use in directional cDNA cloning using cohesive ends produced with T4 DNA polymerase," *Gene*, 112: 147-155 (1992).
Aslanidis et al., "Ligation-independent cloning of PCR products (LIC-PCR)," *Nucleic Acids Research*, 18: 6069-6074 (1990).
Wetmur, "DNA probes: applications of the principles of nucleic acid hybridization," *Critical Reviews in Biochemistry and Molecular Biology*, 26: 227-259 (1991).
Egholm et al., "PNA hybridizes to complementary oligonucleotides obeying the Watson-Crick hydrogen-bonding rules," *Nature*, 365: 566-568 (1993).
Gryaznov et al., "Modulation of oligonucleotide duplex and triplex stability via hydrophobic interactions," *Nucleic Acids Research*, 21: 5909-5915 (1993).
Crick et al., "Codes without commas," *Proc. Natl. Acad. Sci.*, 43: 416-421 (1957).
Ohlmeyer et al., "Complex synthetic chemical libraries indexed with molecular tags," *Proc. Natl. Acad. Sci.*, 90: 10922-10926 (1993).
Brenner and Lerner, "Encoded combinatorial chemistry," *Proc. Natl. Acad. Sci.*, 89: 5381-5383 (1992).

Maskos and Southern, "Oligonucleotide hybridizations on glass supports: a novel linker for oligonucleotide synthesis and hybridization properties of oligonucleotides synthesized in situ," *Nucleic Acids Research*, 20: 1679-1684 (1992).
Mathews and Kricka, "Analytical strategies for the use of DNA probes," *Anal. Biochem.* 169: 1-25 (1988).
Broude et al., "Enhanced DNA sequencing by hybridization," *Proc. Natl. Acad. Sci.*, 91: 3072-3076 (1994).
Nielsen et al., "Synthetic methods for the implementation of encoded combinatorial chemistry," *J. Am. Chem. Soc.* 115: 9812-9813 (1993).
Needels et al., "Generation and screening of an oligonucleotide-encoded synthetic peptide library," *Proc. Natl. Acad. Sci.*, 90: 10700-10704 (1993).
Chetverin et al., "Oligonucleotide arrays: New concepts and possibilities," *Biotechnology*, 12: 1093-1099 (1994).
Yang and Youvan, "A prospectus for multispectral-multiplex DNA sequencing," *Biotechnology*, 7: 576-580 (1989).
Church et al., "Multiplex DNA Sequencing," *Science*, 240: 185-188 (1988).
Beck et al., "A Strategy for the amplification, purification, and selection of M13 templates for large-scale DNA sequencing," *Analytical Biochemistry*, 212: 498-505 (1993).
Ji and Smith, "Rapid purification of double-stranded DNA by triple-helix-mediated affinity capture," *Anal. Chem.*, 65: 1323-1328 (1993).
Brown et al., "A new base-stable linker for solid-phase oligonucleotide synthesis," *J. Chem. Soc. Commun.* 1989: 891-893.
Oliphant et al., "Cloning of random-sequence oligodeoxynucleotides," *Gene*, 44: 177-183 (1986).
Hunkapiller et al., "Large-scale and automated DNA sequence determination," *Science*, 254: 59-67 (1991).
Coche et al., "Reducing bias in cDNA sequence representation by molecular selection," *Nucleic Acids Research*, 22: 4545-4546 (1994).

Primary Examiner—Jasemine C. Chambers
Assistant Examiner—Scott D. Priebe
Attorney, Agent, or Firm—Stephen C. Maccivicz

[57] **ABSTRACT**

The invention provides a method of tracking, identifying, and/or sorting classes or subpopulations of molecules by the use of oligonucleotide tags. Oligonucleotide tags of the invention each consist of a plurality of subunits 3 to 6 nucleotides in length selected from a minimally cross-hybridizing set. A subunit of a minimally cross-hybridizing set forms a duplex or triplex having two or more mismatches with the complement of any other subunit of the same set. The number of oligonucleotide tags available in a particular embodiment depends on the number of subunits per tag and on the length of the subunit. An important aspect of the invention is the use of the oligonucleotide tags for sorting polynucleotides by specifically hybridizing tags attached to the polynucleotides to their complements on solid phase supports. This embodiment provides a readily automated system for manipulating and sorting polynucleotides, particularly useful in large-scale parallel operations, such as large-scale DNA sequencing, mRNA fingerprinting, and the like, wherein many target polynucleotides or many segments of a single target polynucleotide are sequenced simultaneously.

31 Claims, 6 Drawing Sheets